

## CLAIMS

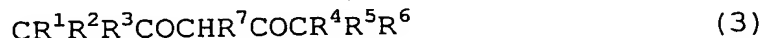
1. A process for preparing a  $\beta$ -diketone compound represented by the following formula (3), comprising a step 1 of reacting an ester compound represented by the following formula (1) with a ketone compound represented by the following formula (2) in the presence of an alkali metal alkoxide catalyst,



wherein  $\text{R}^1$  to  $\text{R}^3$  are each independently hydrogen or an alkyl group of 1 to 3 carbon atoms, and Q is an alkyl group,



wherein  $\text{R}^4$  to  $\text{R}^6$  are each independently hydrogen or an alkyl group of 1 to 3 carbon atoms, and  $\text{R}^7$  is hydrogen or an alkyl group of 1 to 4 carbon atoms,



wherein  $\text{R}^1$  to  $\text{R}^7$  have the same meanings as defined above and at least one of  $\text{R}^1$  to  $\text{R}^6$  is hydrogen.

2. The process as claimed in claim 1, wherein at least one compound selected from an ester compound represented by the following formula (1), liquid amide and liquid urea is used as a solvent,



wherein R<sup>1</sup> to R<sup>3</sup> are each independently hydrogen or an alkyl group of 1 to 3 carbon atoms, and Q is an alkyl group.

5           3. The process as claimed in claim 1, wherein the compound represented by the formula (1) is an alkyl isobutyrate, the compound represented by the formula (2) is 3-methylbutanone, and the compound represented by the formula (3) is 2,6-dimethyl-3,5-heptanedione.

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4. The process as claimed in claim 3, wherein the reaction is carried out using the alkyl isobutyrate as a solvent and using no other solvent.

15           5. The process as claimed in claim 3, wherein liquid amide or liquid urea is used as a solvent.

6. The process as claimed in claim 5, wherein the solvent is at least one solvent selected from N,N<sup>-</sup>dimethylformamide, N,N-dimethylacetamide, N-methylpyrrolidone and 1,3-dimethyl-2-imidazolidinone.

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7. The process as claimed in claim 6, wherein the solvent is N,N-dimethylformamide and/or 1,3-dimethyl-2-imidazolidinone.

5 8. The process as claimed in any one of claims 4 to 7, wherein the amount of the solvent used is in the range of 3 to 30 times by mass based on the 3-methylbutanone.

10 9. The process as claimed in any one of claims 3 to 7, wherein the alkali metal of the alkali metal alkoxide catalyst is sodium or potassium.

15 10. The process as claimed in claim 9, wherein the alcohol portion of the alkali metal alkoxide catalyst is a tertiary alcohol.

20 11. The process as claimed in any one of claims 3 to 7, wherein the amount of the alkali metal alkoxide catalyst used is in the range of 1 to 10 times by mol based on the 3-methylbutanone.

12. The process as claimed in claim 3, comprising a step 1 of synthesizing 2,6-dimethyl-3,5-heptanedione by

reacting the alkyl isobutyrate with the 3-methylbutanone in the presence of the alkali metal alkoxide catalyst and a step 2 of adding an acid to the reaction solution of 2,6-dimethyl-3,5-heptanedione to perform neutralization and adding water to the solution to separate the solution into two layers and thereby isolate the 2,6-dimethyl-3,5-heptanedione as an oil layer.

13. The process as claimed in claim 12, wherein the acid is at least one acid selected from sulfuric acid, hydrochloric acid and nitric acid.

14. The process as claimed in claim 12 or 13, comprising recovering the alkyl isobutyrate, 3-methylbutanone and the solvent from the oil layer containing 2,6-dimethyl-3,5-heptanedione by distillation separation and reusing them in the reaction.

15. A process for preparing a 2,6-dimethyl-3,5-heptanedione metal complex, comprising a step 3 of reacting the 2,6-dimethyl-3,5-heptanedione obtained in the process of claim 12 with a metal salt.

16. The process as claimed in claim 15, wherein the metal salt is at least one metal salt selected from the group consisting of a halide, a nitrate, a sulfate and a phosphate of a metal.

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17. The process as claimed in claim 16, wherein the metal salt is a chloride of a metal and/or a nitrate of a metal.

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18. The process as claimed in claim 15, wherein the metal of the metal salt is at least one metal selected from transition metals and alkaline earth metals.

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19. The process as claimed in claim 18, wherein the metal is at least one metal selected from alkaline earth metals, rare earth metals, Ti, Zr, Hf and Cu.

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20. The process as claimed in claim 15, wherein a hydrophilic solvent is used as a solvent in the reaction of the 2,6-dimethyl-3,5-heptanedione with the metal salt.

21. The process as claimed in claim 20, wherein the hydrophilic solvent is an alcohol of 1 to 4 carbon atoms.

22. The process as claimed in claim 21, wherein the alcohol is methanol.

23. The process as claimed in claim 15, wherein  
5 after the reaction is completed, water is added to precipitate the 2,6-dimethyl-3,5-heptanedione metal complex, followed by isolating the metal complex.

24. The process as claimed in any one of claims 15  
10 to 23, wherein the 2,6-dimethyl-3,5-heptanedione metal complex is a metal complex wherein 2 to 4 molecules of 2,6-dimethyl-3,5-heptanedione are coordinated to 1 atom of the metal.

15 25. A process for preparing a metal or a metallic compound, in which the 2,6-dimethyl-3,5-heptanedione metal complex obtained by the process according to claim 15 is used as a starting material.

20 26. The process as claimed in claim 25, wherein the 2,6-dimethyl-3,5-heptanedione metal complex is used in a vaporized form.

27. The process as claimed in claim 26, which involves chemical vapor deposition.

28. The process as claimed in any one of claims 25 to 27, wherein the metal or the metallic compound produced is a metal oxide.

29. The process as claimed in claim 28, wherein the metal oxide produced is a metal oxide film.